Claims

What is claimed is:

1. A method for implementing a virtual leased line (VLL), comprising the steps of:

A. configuring a virtual local area network (VLAN) label stack on the basis of VLAN QinQ;

B. configuring a VLAN QinQ switching device and a multi-protocol label switching (MPLS) device to communicate with each other;

C. extending a label distribution protocol (LDP) to support encapsulation of VLAN labels, so as to carry out VLAN label assignment and take the extended LDP as a topology discovery protocol for an L2 virtual private network;

D. setting the range of VLAN labels;

E. implementing a VLL by constructing a VLAN switching path, on the basis of the steps A, B, C, and D.

2. The method for implementing a VLL according to claim 1, wherein

the VLAN label stack is configured into a structure with one layer; or

the VLAN label stack is configured into a structure with two or more layers, with labels in the outermost two layers in VLAN QinQ format and labels in other layers in MPLS format.

3. The method for implementing a VLL according to claim 1, wherein the step B further comprises the sub-steps of:

B1. if the VLAN QinQ switching device is at upstream,

accomplishing conversion from VLAN QinQ encapsulation to MPLS encapsulation at an outgoing interface of the VLAN QinQ switching device;

B2. if the VLAN QinQ switching device is at downstream, assigning an MPLS label with the same range as VLAN labels to the upstream MPLS device by the VLAN QinQ switching device, identifying the MPLS label at the incoming interface of the VLAN QinQ switching device, and treating the label as a VLAN label, with the upstream MPLS device not modified.

4. The method for implementing a VLL according to claim 1, wherein the step B further comprises the sub-steps of:

B1. if the VLAN QinQ switching device is at upstream, accomplishing conversion from VLAN QinQ encapsulation to MPLS encapsulation at an outgoing interface of the VLAN QinQ switching device;

B2. if the VLAN QinQ switching device is at downstream, assigning a VLAN label to the upstream MPLS device by the VLAN QinQ switching device, with the upstream MPLS device modified to support the VLAN QinQ encapsulation.

5. The method for implementing a VLL according to claim 1, wherein in the step C, a VLAN label type length value used to carry the VLAN label is set in a label map message, so as to assign a VLAN label to an upstream device.

6. The method for implementing a VLL according to claim 1, wherein identical VLAN labels entering via different interfaces are treated as different labels.

7. The method for implementing a VLL according to claim 1, wherein the VLAN QinQ switching device notifies a neighboring device that it is a VLAN QinQ switching device by adding a session parameter carrying a VLAN label range used by the VLAN QinQ switching device in an LDP initialization message.

8. The method for implementing a VLL according to claim 7, wherein after LDP initialization, the VLAN QinQ switching device assigns a VLAN label value within the set range when assigning a VLAN label to the neighboring device.

9. The method for implementing a VLL according to claim 1, wherein in the step D, the VLAN label range setting is implemented by adding a VLAN label request object that carries the VLAN label range value in a Resource Reservation Protocol-Traffic Engineering PATH message.

10. The method for implementing a VLL according to claim 1, wherein in the step E, the VLAN switching path is constructed with a tunnel multiplexing mechanism.